Subsystems Guide

Axiom Software

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axiom software

Contents

Overview

Security subsystems allow you to define groups of users to be managed as a distinct "subset" of users within the system. Using subsystems, you can:

- Define a group of users to belong to the subsystem and be limited to a certain maximum level of permissions. When you create a subsystem, you are essentially drawing a permissions boundary that users who belong to the subsystem cannot cross.
- Assign one or more subsystem administrators who can manage security for the users that belong to the subsystem. This allows you to give certain users the right to manage other users' permissions, without needing to grant them full administrator rights or even full security administration rights.

Subsystems are *not* an alternative to roles. Roles grant permissions as a group; roles cannot be used to deny permissions or to grant user management rights. Subsystems are intended for situations where you need to create independently-managed user groups that work within the same system but only need access to specific defined areas of that system. Roles can then be used to grant permissions within the limits of the subsystem.

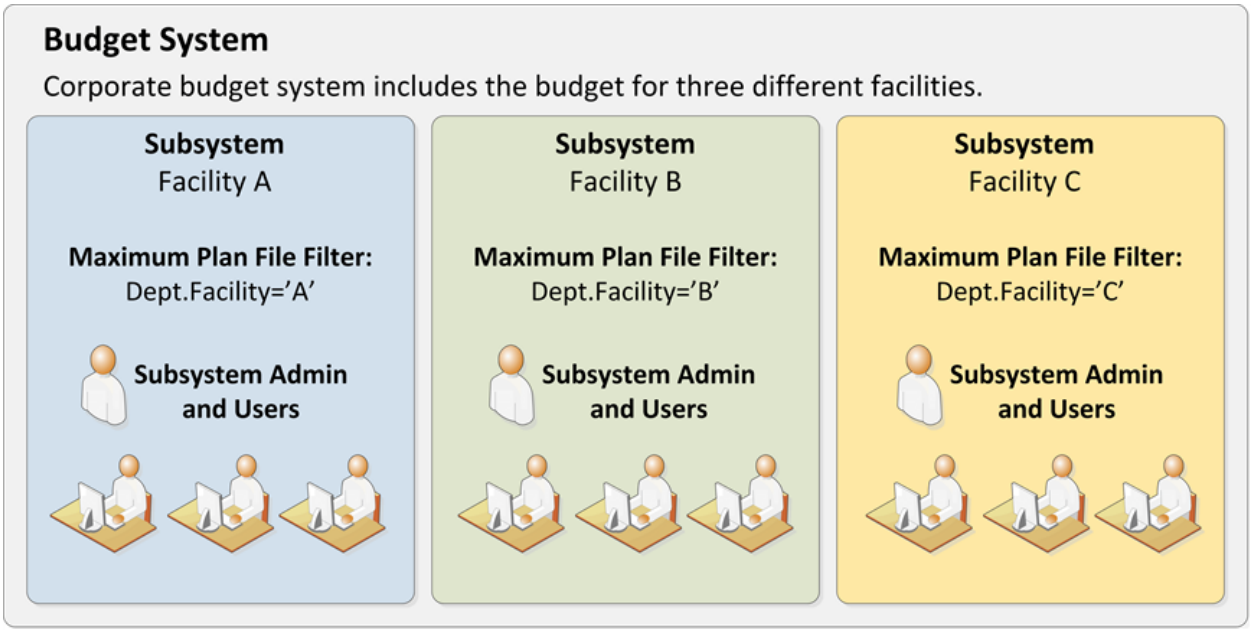
NOTE: Subsystems are optional. Subsystem features are only available if you have enabled them using the system configuration settings.

About subsystems

Subsystems are used to create distinct groups of users who need to be restricted to a certain maximum level of access. When you create a subsystem, you define:

- The maximum permissions for the subsystem. Using the standard security permission settings, you specify the maximum level of permissions that any user who belongs to this subsystem can have.
- The users who belong to the subsystem. The permissions for these users cannot exceed the subsystem maximum permissions. Roles can also optionally belong to a subsystem, and will be limited to the subsystem maximum permissions.
- The subsystem administrators. Subsystem administrators can access Axiom Software security for purposes of managing users and roles that belong to the subsystem.

For example, imagine that your organization has three different facilities, and you budget for all of these facilities within the same Axiom Software system. Each facility has a set of users, and you want to limit those users to a specific set of plan files and reports. You also want to allow the finance manager of each facility to control the user rights for their facility, but you do not want to make them full system administrators.



Example system with subsystems

You could use subsystems for this configuration as follows:

- Create a subsystem for each of the facilities. You can assign existing users to the subsystem, and/or the subsystem administrator can create users for the subsystem.

- Within each subsystem, specify the maximum level of user rights for that facility. This would include plan file access filters to restrict the set of plan files in a file group, and folder permissions for the Reports Library (for example, each facility might have their own folder in the Reports Library, and you would grant each subsystem permission to only the appropriate folder).
- Within each subsystem, assign the facility's finance manager as the subsystem administrator. That user could then manage the rights for each user in the subsystem, including granting the users rights to the necessary plan files and reports (either individually or by using roles). The users can have a lower level of rights than what is allowed by the subsystem, but they cannot have a higher level.

Each user can belong to one or more subsystems. If a user belongs to multiple subsystems, the limits for each subsystem will be applied independently (in other words, using OR to concatenate the restrictions where applicable instead of AND).

About subsystem administrators

When a user is assigned as a subsystem administrator, that user can access security for the purposes of managing users and roles that belong to the subsystem.

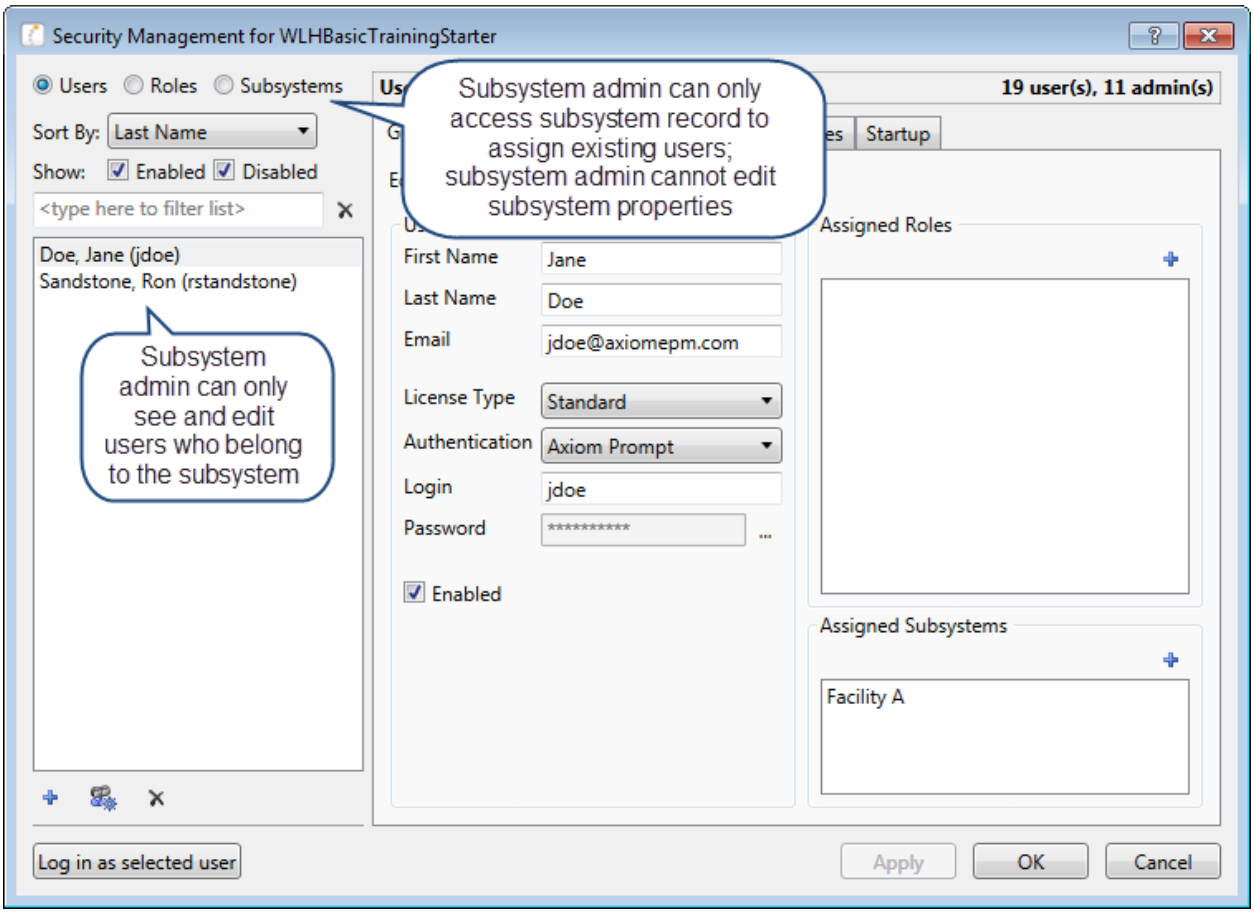
Subsystem administrators are not administrator-level users. The behavior is similar to being granted the **Administer Security** permission, except that the subsystem administrator can only work with users and roles within the subsystem.

Subsystem administrators can do the following:

- Create, edit, and delete users and roles within the subsystem. The subsystem administrator can also assign existing users to the subsystem.
- Assign roles to users in the subsystem. The users can be assigned to subsystem-specific roles or to "global" roles (roles that do not belong to any subsystem).
- Remove locks held by users in the subsystem. This applies to document and table locks, and save data locks, where the subsystem administrator has some level of access to the locked item.
- Use **Log in as selected user** to test the permissions of any user in the subsystem by logging in as that user. (Note that if a system administrator is assigned to the subsystem, the subsystem administrator cannot log in as that user.)

Subsystem administrators cannot edit the subsystem settings, except to assign users and roles to the subsystem. It is assumed that a system administrator creates the subsystem and defines the subsystem settings, and then the subsystem administrator simply manages the users and roles within that framework.

The subsystem administrator can be any user. The subsystem administrator may belong to the subsystem as a user if desired, but that is not a requirement. If the subsystem administrator is also a member of the subsystem, then the subsystem administrator can edit his or her own user permissions, but overall those permissions are restricted by the limits of the subsystem.



Example Security dialog for a subsystem administrator

About subsystems and roles

Subsystems can be used in conjunction with roles. You can assign a user to a subsystem, and then assign the user to one or more roles to grant security permissions. These permissions are then limited by the subsystem boundaries.

There are two ways that you can use roles with subsystems:

- You can assign subsystem users to "global" roles, meaning standard roles that don't belong to a subsystem. These roles can contain users that belong to any subsystem (or to no subsystem). The role permissions are inherited "as is" by the user and then the user's effective permissions are restricted by their assigned subsystem.
- You can assign a role to a subsystem, and then assign users in the subsystem to the role. In this case, only users who also belong to the subsystem can belong to the role. Also, the role permissions are restricted by the assigned subsystem before the user inherits the permissions.

Subsystem-specific roles are recommended if users may belong to multiple subsystems, due to the small but crucial difference in how role inheritance and subsystem restrictions interact. Also, subsystem administrators can create and edit subsystem-specific roles, which provides the subsystem administrator

with greater control over the use of roles with their subsystem users. When using global roles, subsystem administrators can only assign users to the role, they cannot edit the role or see the role's permissions.

Role inheritance and subsystems

If each user only belongs to one subsystem, then there is no difference in the effective permissions when users inherit permissions from global roles or from subsystem-specific roles. However, if a user can belong to multiple subsystems, then the effective permissions can vary depending on which type of role is used.

To illustrate this difference, consider the following plan file filter settings for a file group:

User configured permission:	No Access
Role configured permission:	All Plan Files
Subsystem maximum permission:	DEPT.Facility=5

In this configuration, it doesn't matter whether the role is global or whether it belongs to the subsystem. In both cases, the user will ultimately be restricted to plan files that are assigned to Facility 5. If the role is global, then the subsystem restriction of Facility 5 will be applied to the user after the role inheritance. If the role belongs to a subsystem, then the Facility 5 restriction will be applied to the role before the permissions are inherited. Either way, the end result of the effective permission is the same.

Now consider what can happen if the role is global and the user belongs to two subsystems instead of just one:

User configured permission:	No Access
Role configured permission:	All Plan Files
Subsystem 1 maximum permission:	DEPT.Facility=5
Subsystem 2 maximum permission:	All Plan Files

In this configuration, the user inherits the permission from the global role before the subsystem restrictions are applied to the user. So the user's starting permission is All Plan Files. Because the user's multiple subsystem restrictions are combined using OR, the ultimate subsystem restriction is Dept.Facility=5 OR All Plan Files (which effectively means no restriction—the combined subsystem maximum permission allows access to all plan files). Together with the inherited role permission, this means the user has access to all plan files.

The organization may have intended the user to have access to all plan files. The user belongs to Subsystem 2 and that subsystem allows access to all plan files, so it is a valid result if the user is assigned to a role that grants access to all plan files. However, a potential issue may arise if the role assignment was made by the Subsystem 1 administrator. This subsystem administrator may not know that the user also belongs to Subsystem 2 and/or may not know that Subsystem 2 has a maximum permission of All Plan Files. The Subsystem 1 administrator can only consider the impact of his or her subsystem's restrictions, which would limit the user to plan files from Facility 5. The granting of all plan files via the Subsystem 2 maximum permission may be unintentional.

So if subsystem administrators are managing role assignments and users can belong to multiple subsystems, the only way to ensure that permissions are limited by each respective subsystem is to use subsystem-specific roles instead of global roles. For example, consider the following configuration where the user belongs to multiple subsystems and is assigned to subsystem-specific roles:

User configured permission:	No Access
Role configured permission (Subsystem 1):	All Plan Files
Role configured permission (Subsystem 2):	No Access
Subsystem 1 maximum permission:	DEPT.Facility=5
Subsystem 2 maximum permission:	All Plan Files

Now the role filters are limited by the subsystem restrictions *before* the user inherits permissions from the roles. This gets resolved as follows:

- Subsystem 1 role permission of All Plan Files is restricted by the Subsystem 1 maximum permission of Dept.Facility=5. The user can access only those plan files that belong to Facility 5.
- Subsystem 2 role permission of No Access needs no further resolution—the user is not granted access to any plan files via this subsystem.
- So even though the user's combined subsystem restriction is the same as in the previous example, this is no longer an issue because the role permissions are restricted by their respective subsystems before being inherited by the user. In this case this means the user is only granted the plan file access from the Subsystem 1 role, meaning the user only has access to plan files for Facility 5.

Now imagine the same permissions except that the role configured permission for Subsystem 2 is Dept.VP='Smith' instead of No Access. Now the user's effective permission is as follows:

```
(DEPT.VP='Smith') OR (DEPT.Facility=5)
```

This means the user can access any plan files from Facility 5, and any plan files where the assigned VP is Smith.

Enabling subsystems

Subsystems are not available for use until they have been enabled for your system. The system configuration settings control whether subsystems are enabled.

To enable subsystems, set the **SubSystemsEnabled** property to **True**. This setting can be modified using the Axiom Software Manager, or by using a Save Type 4 report that is configured to save to the Axiom.SystemConfiguration table. By default this configuration setting is set to False, which means subsystems are not available.

If this configuration setting is enabled, then:

- All subsystem features become available in the Security Management dialog. This includes the ability to create subsystems and assign users and roles to subsystems.

- Subsystem membership is now required for a non-admin user to log in. This rule is intended to ensure that subsystem restrictions apply to all end users in the system. Axiom Software will prevent a user from logging in unless they meet one of the following criteria:
    - The user is an administrator.
    - The user is a subsystem administrator.
    - The user has the Manage Security permission.
    - The user belongs to at least one subsystem.

NOTE: If you enable subsystems, complete the subsystem settings and assignments, and then disable the configuration setting, the subsystem settings will become hidden but they will still be enforced (except for the login restriction). This is not a supported configuration and may have unexpected results if further changes are made to security. Before disabling subsystems, you should first remove all users from any subsystem assignments.

Managing subsystems

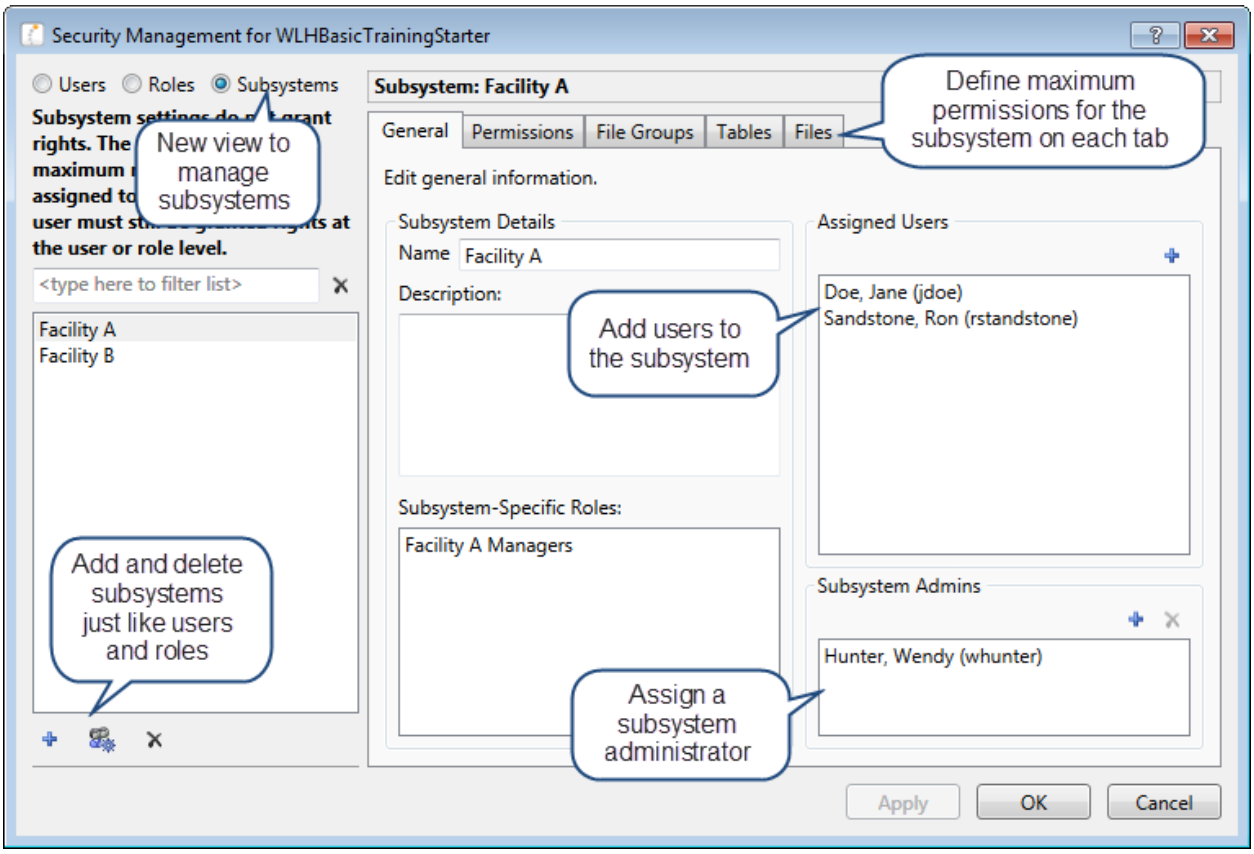
Using the **Security Management** dialog, administrators can create new subsystems, edit existing subsystems, and delete subsystems. To access this dialog:

- On the **Axiom** tab, in the **Administration** group, click **Manage > Security > Security Manager**.

  NOTE: If you are using an Axiom packaged product, you can access this feature from the **Admin** tab. In the **System Management** group, click **Security > Security Manager**.

To work with subsystems, select **Subsystems** in the top left-hand corner of the dialog.

NOTE: Users who are subsystem administrators cannot create, edit, or delete subsystems. When subsystem administrators view subsystems, they are limited to viewing the **General** tab only, for purposes of assigning existing users to the subsystem.



Security dialog with subsystems enabled

To save changes, click **Apply** (or **OK** if you are finished editing security settings).

Creating subsystems

You can create a new blank subsystem, or you can clone the settings of an existing subsystem. If you clone a subsystem, all of that subsystem's settings are copied to the new subsystem, *except* for assigned users.

To create a subsystem, click one of the following buttons located underneath the subsystem list:

- To create a new blank subsystem, click **Create subsystem** ✚.
- To clone an existing subsystem, select that subsystem in the list and then click **Clone subsystem** .

The new subsystem is added to the list. You can define the settings for the new subsystem as desired, and you can assign users and roles to the subsystem. You can also assign a user as a subsystem administrator, to manage the users within the subsystem.

Editing subsystems

To edit a subsystem, select a subsystem from the **Subsystems** list, then make any changes to that subsystem. Changes to subsystem settings take effect when the changes are saved.

Deleting subsystems

To delete a subsystem, select a subsystem from the **Subsystems** list, then click **Delete subsystem** ✕. You are prompted to confirm that you want to delete the subsystem.

A subsystem cannot be deleted if users are assigned to it.

Defining subsystem properties (General tab)

The following settings are available for subsystems on the **General** tab.

Subsystem Details

Each subsystem has the following general properties:

Item	Description
Name	The name of the subsystem.
Description	A description of the subsystem.

Subsystem-Specific Roles

Multiple roles can be assigned to a subsystem. If the subsystem already has assigned roles, those roles are displayed here.

It is not possible to assign roles from the subsystem record. Roles can be assigned to subsystems from the role record, using the **Subsystem** box. See Managing subsystem roles.

Assigned Users

Multiple users can be assigned to a subsystem. If the subsystem already has assigned users, those users are displayed here.

Subsystem assignments can be made when editing either the user or the subsystem. See Managing subsystem users.

Subsystem Admins

One or more users can be assigned as a subsystem administrator. Only administrators can assign or remove a subsystem administrator. Subsystem administrators do not see this section when they view the subsystem record.

- To assign a user as a subsystem administrator, click **Add** ✚. In the **Assign Users** dialog, you can select one or more users to add as a subsystem administrator.

  Assigning a user as a subsystem administrator does not automatically add the user to the subsystem. Subsystem administrators are not required to belong to the subsystem. However, if

you want the user to also belong to the subsystem, then you must separately assign the user to the subsystem.

- To remove a user as a subsystem administrator, select the user in the list and then click **Remove** ✕. You can select and remove multiple users at once.

Subsystem administrators can access the **Security Management** dialog for the purposes of managing users for the subsystem. Subsystem administrators do not otherwise have administrator-level permissions.

For more information on subsystem administration rights, see About subsystem administrators.

Defining maximum permissions for subsystems

When defining security settings for a subsystem, you are defining the maximum permission that any user who belongs to the subsystem can have. Users are not granted these permissions by the subsystem; they are restricted to having this level of permission or less. Generally this means that you must define the maximum desired settings on each tab of the dialog, or else no users in the subsystem can have access to the features controlled by that tab.

You can imagine the subsystem permissions as defining an outer boundary of user rights. Users that belong to the subsystem can be assigned to roles and can be granted individual permissions as normal. Any user permissions that fall within the subsystem boundary will be given to the user. Any user permissions that fall outside of the subsystem boundary will be ignored.

At minimum, you must define settings on the following tabs:

- **File Groups** tab, to specify which file groups the subsystem can access and the maximum allowed access.
- **Tables** tab, to specify which tables the subsystem can access and the maximum allowed access.
- **Files** tab, to specify which folders and files the subsystem can access and the maximum allowed access. In most cases this will include defining access permissions to reports. Optionally, you can grant access to scheduler jobs, task panes, and imports.

If users in the subsystem will not need any special permissions, then you can ignore the **Permissions** tab. Otherwise, you must define the maximum allowed access on that tab.

NOTES:

- If a user belongs to more than one subsystem, then the allowed permissions in one subsystem may exceed the permissions allowed in another subsystem. In this case the permissions "boundary" is the combination of the subsystems, where the user is granted the more permissive boundary (not restricted to the less permissive boundary). In this circumstance, you may find it useful to use subsystem-specific roles to grant permissions to users instead of "global" roles.
- If a system administrator is assigned to a subsystem, the administrator permission takes precedence over the subsystem limitation. Subsystem limitations do not apply to system administrators.

Permissions tab

Select the check boxes for the permissions that you want to be available to users in the subsystem.

For example, if you know that some users in the subsystem need to have access to Scheduler, then you must select the **Scheduled Jobs User** permission for the subsystem. The users' individual permissions and role inheritance will determine which users in the subsystem actually have the **Scheduled Jobs User** permission.

If no users in the subsystem need to have any of these permissions, then you can leave the entire tab unchecked.

NOTE: In most cases, you should *not* select the **Administer Security** permission for a subsystem. If a subsystem user is granted this permission, they will be able to manage all users and roles in the system, not just the subsystem users and roles. Subsystem administrators do not need to be granted this separate permission in order to manage the users in the subsystem.

File Groups tab

For subsystems, you can define a single permission set for each file group. This maximum permission set will be applied against all permission sets defined for the user and inherited from the user's roles. If no permission set is defined for a file group, then the subsystem does not allow access to that file group.

If you want the users in the subsystem to be able to access plan files in a particular file group, then you must create a permission set and configure it as follows:

- Set the file access level to the highest level that you need to make available to users in the subsystem. Typically this means setting the access to at least **Read-Only**. You must also specify whether the subsystem has access to **Allow Save Data**, **Allow Calc Method Insert**, and **Allow Calc Method Change**. Remember that if you are using process management to manage access to plan files, then you do not need to select Allow Save Data because the plan file process will automatically elevate user permissions as necessary.

  NOTE: The setting **Interacts with Process Management** is not available to subsystem permissions. There is no way to disable process interaction at the subsystem level.

- Apply the permission settings to the maximum group of plan files that you need to make available to users in the subsystem.

  You must either select **All plan files** or specify a plan file filter. For example, if you specify a filter such as `DEPT.Facility=5`, then users in this subsystem can only access plan files for facility 5. Any user or role permission that falls outside of that filter is ignored.

  If the subsystem has a plan file filter, and a user in the subsystem is assigned a plan file filter (either individually or via a role), then the subsystem filter and the user filter are concatenated using AND. This restricts the user to only accessing files that match both the user filter and the subsystem filter. For example, if the subsystem filter is `DEPT.Facility=5` and the user filter is `DEPT.VP='Jones'`, then the user can only access plan files that are assigned to VP Jones AND which belong to facility 5.

NOTE: The **Create New Records** maximum permission is enabled by default for on-demand file groups. This is set automatically on the subsystem whenever a new on-demand file group is created. Also, when you create a new subsystem, this permission is automatically set for any existing on-demand file groups. This behavior is to enable the default permissions for on-demand file groups, which are automatically set to allow creating new records via the Everyone role.

Tables tab

If you want the users in the subsystem to be able to access data in particular tables, then you must define access for the table (at either the table or table type level).

When granting access, you must define the maximum level of access needed for the subsystem. For example, if some users in the subsystem need full access to the GL table type, but other users need filtered access, then you must set the GL table type to full access. The users' individual rights and role inheritance will determine their actual level of rights within this boundary.

If a subsystem has a table filter, and a user in the subsystem is assigned a table filter (either individually or via a role), then the subsystem filter and the user filter are concatenated using AND. This restricts the user to only accessing data that matches both the user filter and the subsystem filter. For example, if the subsystem filter is `DEPT.Facility=5` and the user filter is `DEPT.VP='Jones'`, then the user can only access data for VP Jones within facility 5.

NOTE: The default maximum permission for document reference tables is full access. This is set automatically in the subsystem whenever a new document reference table is created. Also, when you create a new subsystem, the maximum permission is automatically set for any existing document reference tables. This behavior is to enable the default permissions for document reference tables, which are automatically set to full access via the Everyone role.

Files tab

If you want users in the subsystem to be able to access a particular folder or file, then you must define access to those folders / files.

NOTE: Remember that users do not need to be granted access to files that are configured as startup files. If the user or role is assigned a file to open on startup, that file will be opened as a startup file, regardless of whether the subsystem allows access to that file.

Remember that subfolders and files will inherit any permission set at a "parent" folder level (unless permission is explicitly set for the lower level). For this reason, the effective permissions section displays for the subsystem, so that you can select a folder or file and see any inherited permissions for that item.

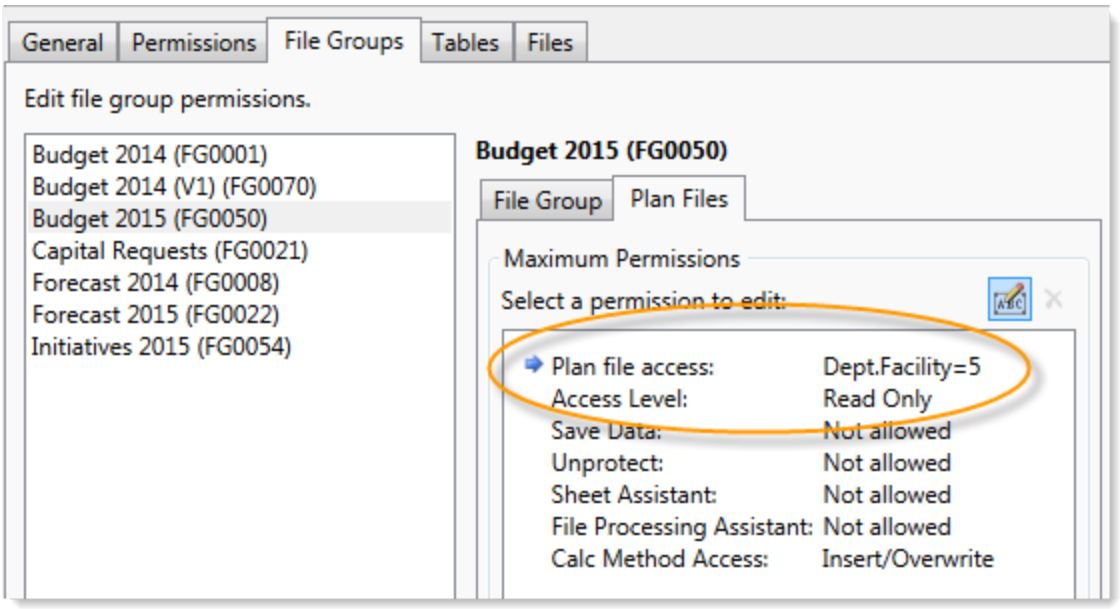
Where applicable, you should attempt to specify permissions at a level that accommodates ongoing folder and file additions. For example, if each subsystem will have its own reports folder and that is the maximum access required, then you can define access for just that folder. If the subsystem needs access throughout the Reports Library, then you most likely want to define the maximum access at the Reports

Library level (perhaps also explicitly blocking access to certain subfolders and files). The users' individual rights and role inheritance will determine their actual level of rights within this boundary.

Example

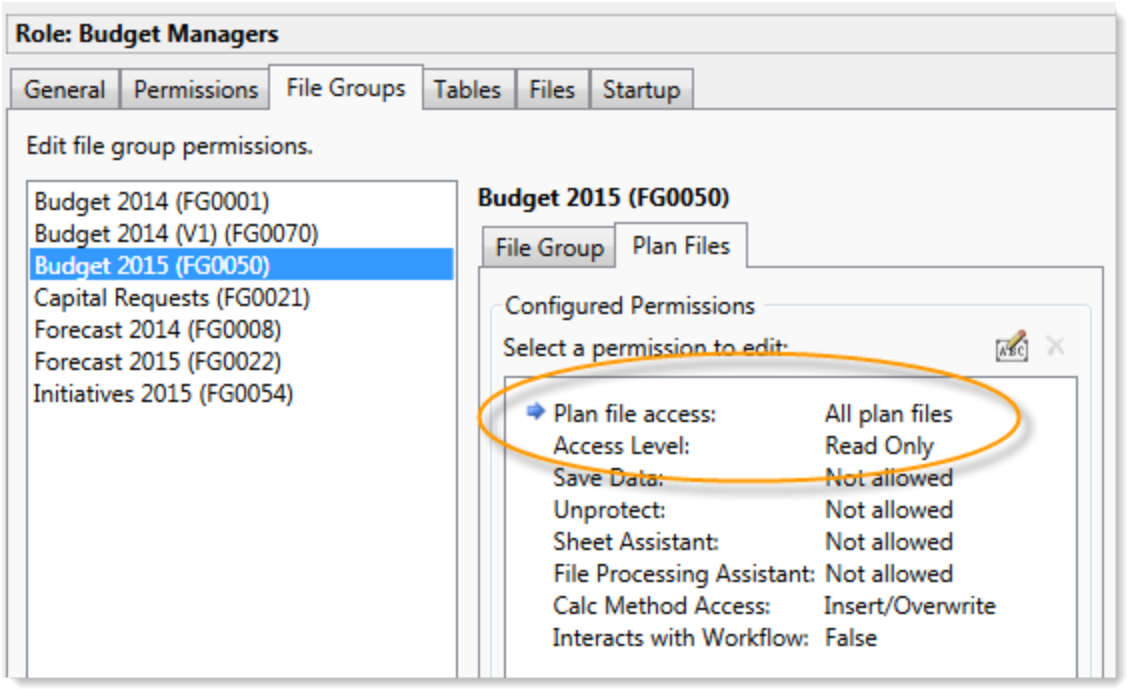
This example illustrates how subsystem maximum permissions limit users who are assigned to the subsystem.

The following screenshot shows file group maximum permissions for a subsystem named Facility5. For file group Budget 2015, the subsystem is limited by the following filter: `DEPT.Facility=5`. Users who belong to this subsystem can only access plan files that are assigned to Facility 5.



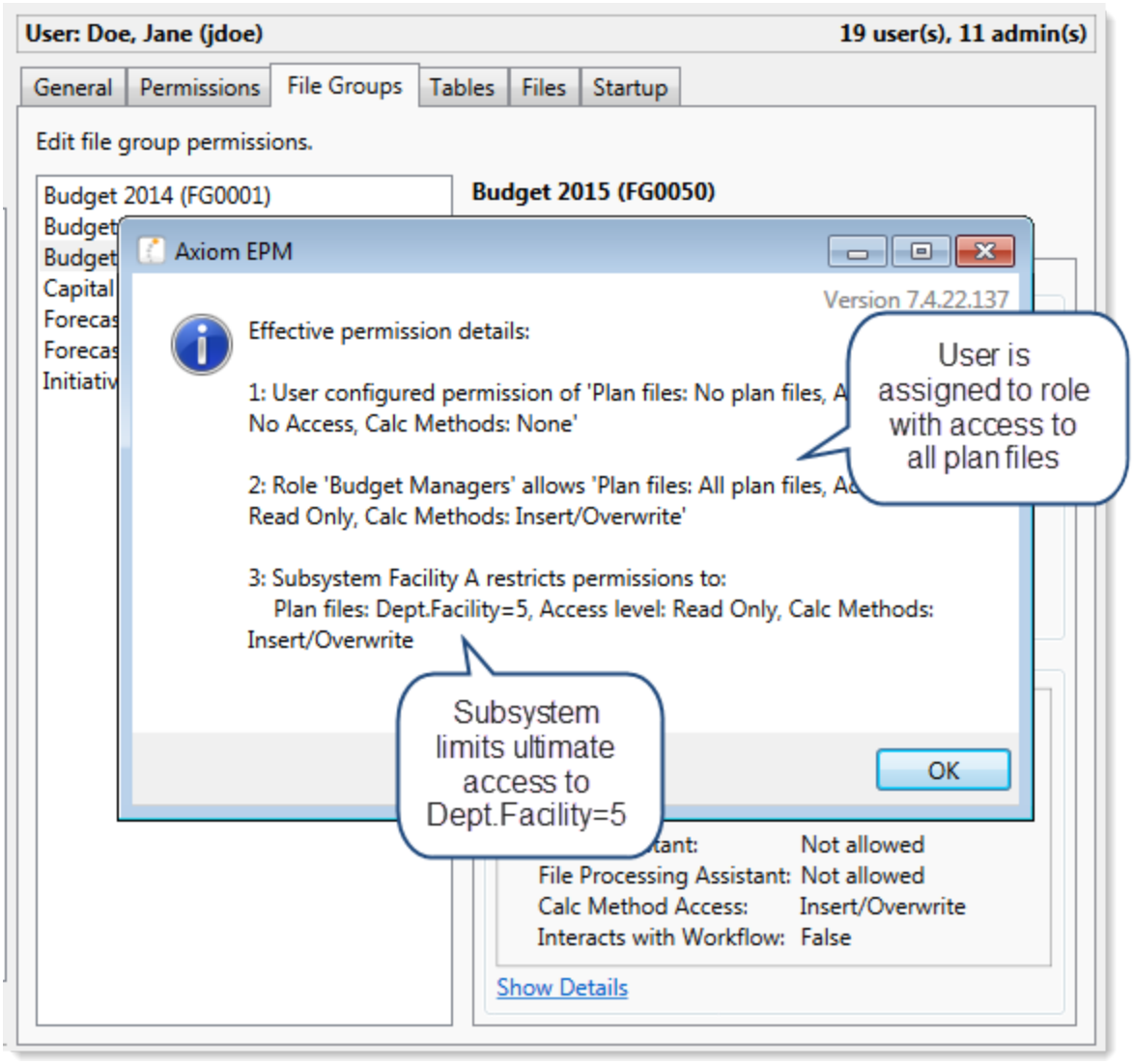
Subsystem maximum permissions

Subsystem settings do not grant any permissions; they only define a maximum boundary of permissions. Therefore users assigned to the subsystem must also be assigned to roles or be granted their own individual security permissions. Imagine that some users belonging to the Facility5 subsystem are also assigned to the Budget Managers role. This role grants access to all plan files within file group 2012 Budget.



Role permissions

Although the role grants access to all plan files, the subsystem is limited to DEPT.Facility=5. The users in the subsystem cannot have greater permission than what is allowed by the subsystem (assuming the users only belong to one subsystem). Therefore the effective permission for this user is DEPT.Facility=5.



User effective permissions once roles and subsystems are applied

Managing subsystem roles

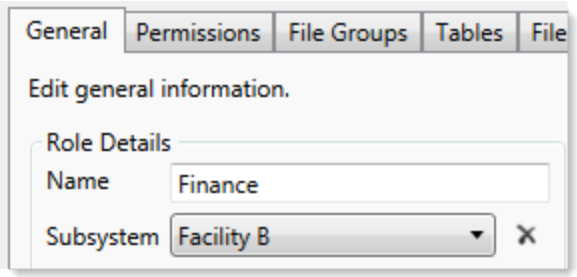
You can create new roles for a subsystem, and you can assign existing roles to a subsystem. When a role belongs to a subsystem, the role permissions are restricted by the subsystem boundaries, and all users in the role must also belong to the subsystem.

When assigning subsystem users to roles, you can use the subsystem roles or you can use "global" roles (that do not belong to the subsystem). For more information on the difference in behavior, see About subsystems and roles.

The subsystem settings should be completed before assigning any roles (unless the roles do not contain any users yet), to ensure that all desired subsystem restrictions are in place before any subsystem users log in.

Assigning a role to a subsystem

When you create or edit a role, you can assign it to a particular subsystem. Use the **Subsystem** drop-down list on the **General** tab to assign the role to a subsystem.



- This assignment can only be made on the role record. The **Subsystem-Specific Roles** section on the subsystem record is for information only; assignment changes cannot be made there.
- Only administrators can assign an existing role to a subsystem. If the role already has assigned users who do not belong to the subsystem when the role is assigned to the subsystem, then a validation error displays in the Security Management dialog. All users in the role must belong to the subsystem in order to assign the role to the subsystem.
- Subsystem administrators can create new roles for the subsystem. When a subsystem administrator creates a new role, it is automatically assigned to the subsystem when it is created. If the subsystem administrator manages multiple subsystems, then the role's subsystem assignment can be changed to any of those subsystems.
- Only administrators can remove a role from a subsystem. Click the **Remove** button ✕ to clear the assigned subsystem.

Managing subsystem users

You can create new users for a subsystem, and you can assign existing users to a subsystem. When a user belongs to a subsystem, the user's permissions are limited according to the subsystem boundaries. Users can belong to multiple subsystems.

The subsystem settings should be completed before assigning any users, to ensure that all desired subsystem restrictions are in place before any subsystem users log in.

If the subsystem feature is enabled, then all non-admin users must be assigned to a subsystem. If a user does not belong to a subsystem, then that user will be blocked from logging in (unless the user is an administrator, a subsystem administrator, or a user with the **Manage Security** permission). This is to ensure that all non-admin users have a subsystem limit applied to their security permissions.

Assigning existing users to a subsystem

Administrators can assign existing users to a subsystem from either the user record or the subsystem record. Any changes made in one area are automatically applied to the other area.

- From the subsystem record, on the **General** tab, click the **Add** + button in the **Assigned Users** section to add a user to the subsystem.
- From the user record, on the **General** tab, click the **Add** + button in the **Assigned Subsystems** section to assign the user to a subsystem.

Subsystem administrators can assign existing users to a subsystem, but only from the subsystem record. This is because subsystem administrators cannot see user records for users that do not already belong to the subsystem.

Creating new users for a subsystem

Subsystem administrators can create new users for use in a subsystem. When the new user is created, the user is automatically assigned to the subsystem.

If the subsystem administrator manages multiple subsystems then one of those subsystems will be assigned at random when the user is created. Once the user has been saved, the subsystem administrator can edit the user to change the subsystem assignment as needed.

When creating a new user, administrators must save the new user before they are able to assign a subsystem. The **Assigned Subsystems** box is not editable until the user has been saved.

Removing a user from a subsystem

Administrators and subsystem administrators can remove a user from a subsystem. This can be done from either the user record or the subsystem record.

- From the subsystem record, on the **General** tab, select one or more users in the **Assigned Users** section and then click the **Remove** ✕ button.
- From the user record, on the **General** tab, select one or more subsystems in the **Assigned Subsystems** section and then click the **Remove** ✕ button.

If a non-admin user is removed from all subsystems, then that user will no longer be able to log into Axiom Software. The user must be assigned to a subsystem or granted administer-level permissions before they are able to log in again.